Figure 9. In this filament no conjugation was discovered in any part of it, but the cells *a* and *b* have each sent out a tube at their adjoining ends, as *c* and *d* are also beginning to do, while *c* has sent out an additional tube at the other end.

Figure 10 is doubtless a later stage of the last, the two tubes together conjugating with a third and lower cell.

Figure 11 is another phase of polygamous conjugation, while *Figure 12* shows strong inclinations in that direction.

GENERAL NOTES.

Acer pseudo-platanus is a common shade-tree about our streets. The fruit is now forming and in every raceme I find one or more of the samaras composed of three or four carpels, instead of the normal number, two.

Catalogue of New Brunswick Plants.—We are indebted to Mr. George U. Hay, of Carleton, N. B., for the Bulletin of the Natural History Society New Brunswick, No. IV. This contains "A preliminary list of the plants of New Brunswick," by Prof. James Fowler, M. A. The Rev. Mr. Fowler was for a long time a resident of New Brunswick, and has been the most active collector of the region. He now resides at Kingston, Ontario. We are surprised to find how recently botanical observation began in this province, and feel as if we could almost rank ourselves among the early collectors. The earliest published information dates back only to 1862, and in 1864 the writer collected largely about Fredericton, St. Stephen, and Campo Bello, continuing his work in the years 1866, 1868 and 1872. Unfortunately he has preserved very little material from those explorations. To return to Mr. Fowler's list, it is an extremely interesting one in many ways; its author was indefatigable in his researches. He has found some curious cases of extra-limital distribution. For instance at Eel River, Restigouche County, *Collomia linearis* occurs. "If it is not native, it is at least thoroughly naturalized." Mr. G. F. Mathew, of St. John, has elsewhere pointed out how the river St. John affects the distribution of plants. Indeed, the whole district is well worth further study. There are rich collecting grounds already familiar, like the marshes of the Kennebeckosis, but the flora of much the larger part of the province remains practically unknown. The members of the geological survey record what they find, but their attention is too much engaged upon other work to allow careful exploration. Not the least interesting part of the list is the appended catalogue of ballast plants gathered around St. John, Portland, etc. The list is well edited and printed, and will repay careful perusal.

Utricularia cornuta.—On Decoration Day it has been my habit for a long time to take an excursion in the woods. This year I was rewarded by seeing a most magnificent display of *Utricularia cornuta*, a mass of yellow liter-

ally covering one side of a secluded pond, and quite out of reach. Is this not an early date for it?—W. W. BAILEY.

The Torsion of Leaves.—The following is the substance in tabular form of a paper read before Section F of the Am. Ass. Ad. Sci. at its Philadelphia meeting, by Prof. W. J. Beal, of the Agricultural College, Michigan. In the case of plants whose leaves are not erect they are supposed to be erect when the direction of twist is given.

NAMES OF PLANTS.	Number of Plants examined.	Number of leaves examined.	Direction of Twist.	Number of revolutions.	REMARKS.
Chenopodium album..	.....	.....	Indifferent.....	½	Structure of both surfaces alike: ¼ more stomata on lower. Keep same position during dry nights.
Typha latifolia.....	.....	Sev'l 1000	All with the sun.....	1½—2	Structure alike.
Typha augustifolia.....	.....	300	All with the sun.....	.....	Structure alike.
Sparganium—sp?.....	.....	75	All with the sun.....	1 or less.	Plants shaded.
Acorus calamus.....	A few	.....	Most with the sun....	½	Young leaves most twist'd
Fritillaria imperialis...	.....	.....	All with the sun.....	.....	
Allium carinatum.....	.....	.....	Most with the sun....	½	
" porrum.....	104	.....	All with the sun.....	1	
" cernuum.....	.....	.....	Indifferent.....	½–1½	
Iris speciosa.....	.....	.....	Most with the sun....	1 or less	
" three other species	.....	.....	Indifferent.....	.....	
Gladiolus, cult. vars....	350	.....	All against the sun....	½	Structure alike. Twist greatest near tips.
Liatris scariosa.....	2	192	179 with the sun.... / 13 against the sun.	..... /	Structure alike: stomata 18 on lower to 12 on upper. Twist greatest near base.
Phleum pratense.....	50	.....	All with the sun.....	.....	Seedlings.
" "	29	121	117 with the sun ... / 4 against the sun	..... /	
Lolium Italicum.....	40	.....	All with the sun.....	.....	Seedlings.
Holcus lanatus.....	30	.....	All with the sun.....	.....	Seedlings.
Bromus secalinus.....	100	.....	All with the sun.....	.....	Young plants.
" Shraderi.....	50	.....	All with the sun.....	.....	
Hulless barley.....	50	.....	All with the sun.....	.....	
Clawson wheat.....	100	.....	All with the sun.....	½	
Triticum repens.....	.....	300	All with the sun.....	¼—½	
Seedling oats.....	.....	.....	All against the sun...	.....	

The author concludes that the conflicting facts observed do not furnish any satisfactory clue to the cause of torsion. Similar variation has been observed in the direction of twining *Calystegia sepium*. The twisting of the leaves may be of advantage to the plant in rendering the leaf more rigid and in allowing both sides to be exposed through part of the length to direct sunlight.

Zopf's Classification of the Bacteria.—The following arrangement of the bacteria by Zopf is probably the most satisfactory one yet proposed. The genera are distributed into four groups, as follows:

1. Coccaceæ. Possessing (as far as our present knowledge reaches), only

the coccus form, and in some species thread forms which are produced by the adhesion of the cocci. Spore formation as yet undemonstrated.

Genera: *Streptococcus*, *Micrococcus*, *Ascococcus*, *Merismopedia*, *Sarcina*.

2. Bacteriaceæ. Possessing mostly cocci, rods (straight or curved), and thread forms (straight or spiral). The first may be wanting; the latter have no distinction of base and apex. Division, so far as known, in one direction only. Spore formation existing, or wanting, or unknown.

Genera: *Bacterium*, *Spirillum*, *Vibrio*, *Leuconostoc*, *Bacillus*, *Clostridium*.

3. Leptotricheæ. Possessing cocci, rods, and thread forms (which show a distinction of base and apex). The latter straight or spiral. Spore formation not demonstrated.

Genera: *Leptothrix*, *Beggiatoa*, *Crenothrix*, *Phragmidiothrix*.

4. Cladotricheæ. Possessing cocci, rods, thread and spiral forms. The thread form is provided with false branches. Spore formation not yet demonstrated.

Genus: *Cladothrix*.—From *Die Spaltpilze*.

Stopper for Bacteria Culture Vessel.—In recent numbers of *La Nature* Dr. H. Fol, of Geneva, Switzerland, described, among other things pertaining to bacteria, a permeable stopper for culture vessels that has proved so valuable upon trial that we give an illustration and description of it. In most forms of culture vessels it is impossible to introduce or remove any substance without at the same time exposing the contents of the vessel in some degree to contamination from the germs of the air. In this form a small glass test tube an inch or so long, having a hole in the bottom, is wrapped with cotton and fitted into the mouth of the vessel. It is then half filled with glass wool or asbestos and protected by a mass of cotton (Fig. 1). The contents of the vessel are easily reached by removing the plug of cotton and introducing a capillary glass tube (Fig. 2), glass wool offering little resistance to such a tube while cotton can not be pierced. A translation of part of Dr. Fol's article has appeared in the *Scientific American Supplement*, and since the above was written the larger part of it has been given in *Science*.—J. C. A.

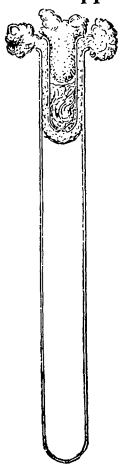

Fig. 1.

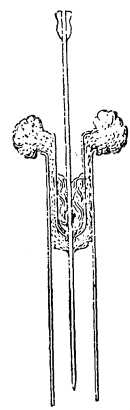

Fig. 2.

Bacteria as Vegetable Parasites.—The only genuine instance of parasitic bacteria in plants yet mentioned by the books (DeBary, Zopf, etc.) is that of the yellow sickness of hyacinths, first described by Dr. Wakker, of Amsterdam, in 1882. This bacterium winters in the bulb scales, and increases in the spring to slimy yellow masses which destroy the tissues and eventually kill the plant. The priority of demonstrating parasitic bacteria in plants belongs however, to an American. In 1880, two years before Dr. Wakker's announcement of bacteria in hyacinths, Professor T. J. Burrill, of Illinois, presented a paper before

the American Association for the Advancement of Science demonstrating the invariable presence of characteristic bacteria in the disease known as pear blight, which attacks pomaceous trees, and that the disease may be transmitted from tree to tree by inoculation. Since then the bacteria have been isolated and cultivated in artificial media, and the statements of the original paper fully confirmed. Americans should have credit for what little original work they do accomplish in bacteriology.—J. C. A.

The Cladophylls of Myrsiphyllum.—Gray's Structural Botany is quite wrong in stating (at least by implication) that the apparent leaves of Myrsiphyllum are vertically expanded, that is, are inserted edgewise on the branch. They are really and most obviously horizontally expanded, in the manner of true leaves. The vertical position which they soon assume is the result of a half twist, differing in this respect from Ruscus, in which the cladodia are vertical from the first. Professor Dickson calls attention to this, in an interesting paper in the Transactions of the Botanical Society of Edinburgh, vol. xvi. But, although the fibro-vascular bundles are arranged in one plane (as also in some species of Ruscus), yet he still regards the organ as a cladophyll. And the two elements of these bundles are disposed in the reverse order to that of the leaf.

In this connection it should be noticed that Van Tieghem (in Bull. Soc. Bot. France, xxxi., 81, 1884), maintains that this organ even in Ruscus is a leaf, the first and only leaf of an axillary branch, or when floriferous, is a leaf with a connate branch.—A. GRAY.

Flowers of the Wild Strawberry.—In this locality, and in other portions of the state where I have been this spring, the flowers of *Fragaria Virginiana* var. *Illinoense* are as constantly polygamous as they are in cultivated varieties. Flowers are either perfect or pistillate. The pistillate appear rather the more numerous. These flowers are commonly small, sometimes not exceeding one-fourth inch in diameter. There is seldom anything more than the merest indications of stamens in these flowers. The perfect flowers are larger, brighter in color, and the numerous yellow stamens render them conspicuous. I can now tell almost invariably the sex of a flower at a distance of two rods.—L. H. BAILEY, JR., *Agricultural College, Mich.*

Addenda et Errata.—In Dr. Koehne's article on the Lythraceæ of the United States, vol. x, pp. 269–277, the following corrections are to be made:

Page 269, line 7 from bottom, for unsymmetrical read symmetrical.

Page 273, line 31, for $1\frac{1}{2}$ to $6\frac{1}{2}$ mm. read, $4\frac{1}{2}$-$6\frac{1}{2}$ mm.

Page 274, to *L. lineare* add New York, New Jersey, Delaware, Florida and Texas; Cuba; Guanajuato and Vera Cruz, Mexico; Virginia, *fide* Elliott.